

A Novel Radiation Shielding Material, Phase II

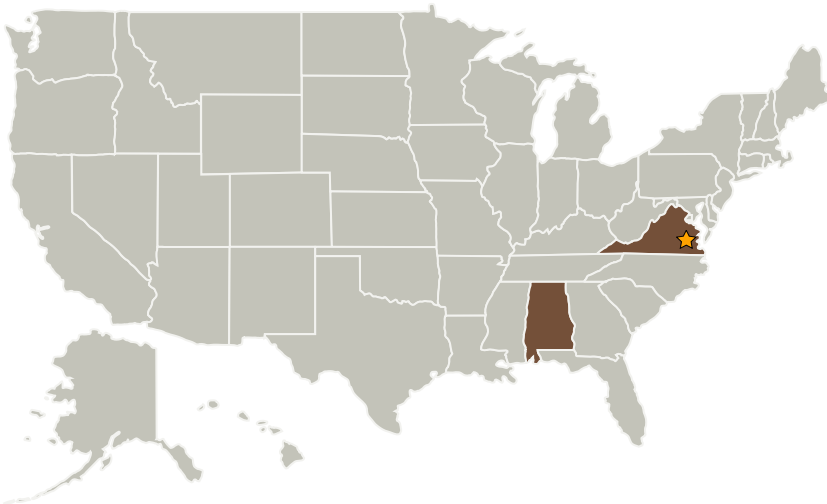
Completed Technology Project (2005 - 2007)



Project Introduction

Radiation shielding simulations showed that epoxy loaded with 10-70% polyethylene would be an excellent shielding material against GCRs and SEPs. Milling produced an elemental boron coating on the polyethylene particles suitable for protecting against low energy neutrons. For up to 30 volume percent particle loading of the composite there was the near random distribution of particles needed to produce an excellent radiation shielding material. The mechanical properties of the composite system were found to decrease ~1000psi with each 10% increase in particle loading. The specific strength of the 10% B coated polyethylene particle epoxy composite was 206,529 in, within 85% of the specific strength of Al 2219. Using a stronger epoxy matrix, the specific strength of the composite developed during Phase II could easily equal or surpass that of Al 2219. During Phase II, radiation testing will be performed. Prototype shielding panels will be constructed. High tensile strength epoxy matrices will be investigated to provide sufficient tensile strength while optimizing the radiation shielding capabilities given by loading the matrix with B coated polyethylene particles. An integrated thermal protection system (TPS) for the optimized composite will be developed that also provides increased strength and impact resistance against micro-meteorites.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Langley Research Center (LaRC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★ Langley Research Center(LaRC)	Lead Organization	NASA Center	Hampton, Virginia
Plasma Processes, LLC	Supporting Organization	Industry Veteran-Owned Small Business (VOSB)	Huntsville, Alabama

Primary U.S. Work Locations

Alabama	Virginia
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Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
 - └ TX12.1 Materials
 - └ TX12.1.1 Lightweight Structural Materials